Operating Instructions

Coin Payout Hopper h² nano

with ccTalk interface and Multi-Drop commands (h²/xxxxx.xxF51..)

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BA_h2_nano_F51_EN_2-1

Crane Payment Solutions GmbH | Zum Fruchthof 6 | 21614 Buxtehude | Germany
Web: info@craneps.com | www.craneps.com | Phone: +49 (0) 41 61-729-0 | Fax: +49 (0) 41 61-729-115

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1 Revision protocol

Version	Revision	Chapters/sections concerned
_2-0	Adjustable hopper functions added: payout timeout, ccTalk empty sensing	4.5 "Motor reverse after coins have been paid out" 4.7.3 "ccTalk empty sensing (H217 Request payout high/low status)"
_2-1	Change of product name (currenza h^2 – h^2 nano)	All

2 General information

This chapter should provide a general overview of the advantages and options regarding the hopper h² nano with ccTalk interface and Multi-Drop Command Extension Set (MDCES). The first section, however, is designed to help you navigate easily within these operating instructions.

2.1 General information about these instructions

These operating instructions describe the design and operation of the NRI hopper h² nano/ xxxxx.xxF51.. with ccTalk interface. Chap. 5 and 6 explain the necessary steps for starting up and operating the hopper. Chap. 7 explicates how to clean the hopper and remedy the cause of a malfunction.

Chap. 8 "Technical data" as well as the appended index reduce the search for specific explanation.

2.1.1 Text conventions

To make it easier for you to navigate within these instructions and to operate the device, the following accentuations were made in the text:

Safety instructions, which you must observe in order to protect operators and equipment.

Special notes, which are to facilitate the use of the hopper.

At the beginning of a chapter you will find a short "guide", which summarises the contents of the chapter.

1 2 3 ... **Requests to perform an action** are numbered in another typeface.

[Fig. 1/2] Reference to a figure. The number before the slash refers to the figure number, the number behind the slash to the item number within the figure.

2.1.2 Additional useful technical documentation

Apart from the operating instructions you already have there is further documentation for the h² nano, e.g., about the firmware update. All documentation is available as PDF at www.nri24.com (⇨ Download).

2.2 General information about the hopper h² nano/xxxxx.xxF51..

The electromechanic hopper h²/xxxxx.xxF51.. is a coin payout system for machines. Depending on the model size and the coin type it can collect 2,000 and more coins, in order to be able to pay out these coins as change on command of the machine control system. Due to its high capacity the hopper is used in machines, that have to pay out certain coins as change frequently, such as money changers, vending and amusement machines.

The h²/xxxxx.xxF51.. is fitted with a ccTalk machine interface and communicates with the control system as slave using the serial ccTalk data transfer protocol including the Multi-Drop Command Extension Set (MDCES) for unambiguous address handling.

The reliable and low-maintenance payout mechanism in the form of a rotating disc driven by a motor is designed extra ruggedly, so that it withstands innumerous coin payouts permanently.

If the hopper is to be filled automatically, it can interact with a coin validation system without any problems (e.g. NRI coin validators v² colibri, G-13.mft, v² eagle, G-40 or NRI coin changers currenza c² spider, E-66/A-66, G-46).

2.2.1 Features of the h² nano/xxxxx.xxF51..

- Models in various sizes (S, M, L, X) for a coin capacity as high as possible depending on the machine dimensions
- Space-saving dual hopper installation thanks to coin passage
- Suitable for paying out a wide range of coins with standard model
- Payout speed of up to 9 coins per second
- High performance and manipulation protection thanks to infrared payout control for coins/tokens with any type of surface, automatic error detection and anti-jam function
- Unambiguous hopper address handling with MDCES
- Flash technology for uncomplicated and time-saving firmware updates using the NRI USB flash programmer (ordering code 32446) and flash software "AT89USB_SPI" (freeware and manual download at www.nri24.com)
- Optional empty and full detection

2.2.2 Scope of delivery

- Hopper h²/xxxxx.xxF51..
- Mounting bracket

2.2.3 Models

Most notably the hopper models differ in the

- coin capacity (S/M/L/X)
- processing of extreme coin dimensions
- supply voltage
- ccTalk product code

All models can be equipped with or without full or empty detection and be fixed onto two different mounting brackets depending on the machine dimensions.

2.2.3.1 Coin capacity (S/M/L/X)

The hopper capacity is defined by shape and depth of the bowl and the front bowl cover.

The four hopper sizes S, M, L, and X are made up of two different sized bowls and two appropriate front covers for each bowl. The width and the height of the hopper is always the same *(cp. Chap. "9.3 Mounting dimensions", p. 38)*. The hopper size is embossed on the front cover **[Fig. 1/]**.

Hopper	Bowl	Cover
h² nano S	small	S (short)
h² nano M	small	M (long)
h² nano L	large	L (short)
h² nano X	large	X (long)

Fig. 1: h² nano M with small bowl and long cover

Exchanging the front cover increases or decreases the hopper capacity.

2.2.3.2 Processing of extreme coin dimensions

Depending on the coin you would like to collect and its dimensions, you may need a hopper purpose-made for, e.g., particularly thick or thin coins *(cp. Chap. "9.1 Device data", p. 33)*:

- h² nano standard (Version 1.0)
- h² nano standard for thin and small coins (Version 1.1)
- h² nano for thick coins (Version 2.0)

2.2.3.3 Supply voltage

Depending on the machine evironment you may have a 12V or 24V hopper (up to model number h²/0) or 11–35V hopper.

2.2.3.4 ccTalk product code

If the h² nano is supposed to replace a G-38 hopper and the machine control system requires a compatible ccTalk product code, the hopper may be delivered sending the "Payout" product code *(cp. Chap. "9.2.1.1 Implemented ccTalk commands", p. 36)*.

2.2.3.5 Full and empty detection

All hopper models are available with empty or full detection or with empty and full detection.

The detection is put into effect using electric contacts in the hopper bowl (not available for retrofitting), which are closed by the coins from a certain filling level on or up to a certain filling level *(cp. Chap. "5 Function", p. 16)*.

2.2.3.6 Mounting bracket

Depending on the installation options in the machine the hopper is either delivered with a mounting bracket with spigots or with a mounting bracket with large base plate *(cp. Chap. "6 Start-up", p. 19)*.

Fig. 2: Mounting bracket with large base plate (LH) and spigots (RH)

3 Safety instructions

Before operating the device for the first time, please read these operating instructions carefully at least once, and most importantly the safety instructions. This is to ensure you have understood the contents of this manual as well as how to operate the hopper.

3.1 Proper use

The NRI hopper h²/xxxxx.xxF51.. with serial ccTalk interface is intended to be used in machines with a ccTalk interface and is supposed to collect coins accepted by the machine/coin validation system or filled in the hopper and to pay them out as change on command of the machine control system. Only use the hopper for this purpose. Under no circumstances can the manufacturer be held liable for any damage or loss resulting from improper use of the device.

The hopper has been constructed in compliance with the state of the art and recognised safety regulations. Nevertheless this equipment can be a source of danger. Therefore please observe the following safety regulations.

3.2 Protecting yourself and equipment

The hopper may only be connected by a qualified electrician.

Only use the hopper according to proper use. Under no circumstances can the manufacturer be held liable for any damage or loss resulting from improper use of the device.

The hopper is not suited for outdoor use. For this it must be protected using a housing/machine with an appropriate protection class.

The hopper PCB is fitted with components that can be damaged by electrostatic discharge. Please observe the handling instructions for components exposed to the risk of electrostatic discharge.

Do not use the hopper, if the device or connecting cable are demaged.

Select the correct voltage for the hopper (see label) and protect the device against overheat demage caused by e.g. short-circuit or overload by means of a 3A-fuse (according to IEC 127).

Never pull the connecting cable of the hopper from the machine when a voltage is applied.

Pull out the machine's mains plug before you install, clean or remove the hopper.

Contact NRI if you wish to alter the construction of the device to a greater extent than that described in these instructions.

Keep water and other liquids away from the hopper.

If the device is no longer required, please dispose of it correctly.

We reserve the right to make technical modifications to the device which are not covered by these instructions!

4 Design

This chapter describes

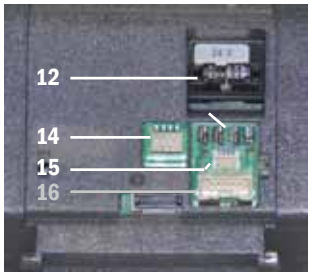
- the main parts the hopper consists of, and
- all parts which you need to operate and start up the hopper.

4.1 Overview of the device

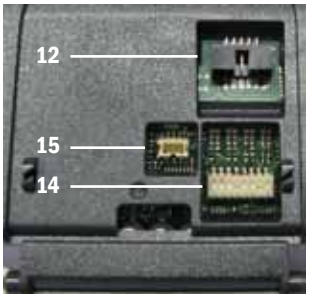
h² nano M front/left side

h² nano M rear/left side

1 Safety flap
2 Payout disc (covered)
3 Front bowl cover
4 Contacts of empty detection
5 Ejector lever, mounting bracket
6 Mounting bracket with spigots
7 Status LEDs (covered, visible through housing)
8 Coin passage
9 Coin outlet
10 Bowl
11 Service cover
12 ccTalk interface – machine
13 Mounting stud
14 Switching block
15 Interface – Empty/full detection
16 For service technicians only



h²/0M – service cover opened



h²/1M – service cover opened

Fig. 3: Design (example: h² nano M)

4.2 Bowl and front bowl cover

The bowl **[Fig. 3/10]** and bowl cover **[Fig. 3/3]** build the hopper funnel, which collects the coins, in order to feed the rotating disc, that pays out the coins **[Fig. 4/]**.

4.3 Rotor, payout disc, and safety flap

The payout disc **[Fig. 4/]** driven by a rotor directs the coins from the bowl into the coin outlet **[Fig. 3/9]** by means of metal pins inserted in the disc.

In order to protect the rotating parts against access during operation and transport the coins optimally, the bowl is provided with a safety flap **[Fig. 3/1]**.

Fig. 4: Payout disc

4.4 Coin passage

The coin passage **[Fig. 3/8]** lets the coins paid out by an additional hopper pass and thus serves as second coin outlet *(cp. Chap. "5.6 Space-saving dual hopper assembly (coin passage)", p. 18)*.

4.5 Mounting bracket

The mounting bracket **[Fig. 3/6]** **[Fig. 5/]** is used to install the hopper in the machine *(cp. Chap. "6 Start-up", p. 19)*. That way the hopper may easily be removed and reinstalled.

Fig. 5: Mounting brackets

4.6 Interfaces

For detailed information on the serial ccTalk machine interface **[Fig. 3/12]** and on the connector for the empty and full detection **[Fig. 3/16]** please refer to *Chap. "9 Technical data", p. 33 (cp. Chap. "5.3 Hopper control", p. 16)*.

4.7 Status LEDs

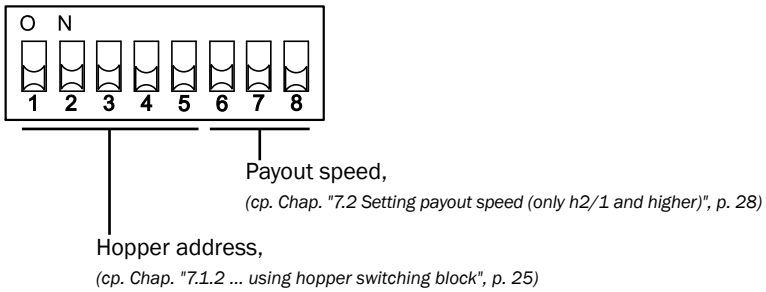
The three status LEDs **[Fig. 3/7]** on the rear of the hopper indicate the operating state or a malfunction):

Green LED		Hopper is receiving control signal and activates motor and payout disc
Yellow LED		Hopper is paying out coin and transmits coin signal to control system
Red LED		Error, number of signals indicates error type *(cp. Chap. "8.2 Troubleshooting", p. 32)*

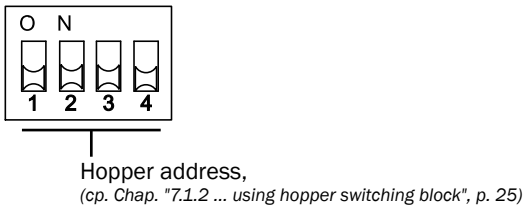
4.8 Switching block of ...

Depending on the hopper series the switching block **[Fig. 3/14]** has four or eight DIL switches to set several functions (for details on how to use the switching block please refer to *Chap. "7 Operation", p. 24*):

4.8.1 ... h²/1 and higher


O N
1 2 3 4 5 6 7 8
Payout speed,
(cp. Chap. "7.2 Setting payout speed (only h2/1 and higher)", p. 28)
Hopper address,
(cp. Chap. "7.1.2 ... using hopper switching block", p. 25)

4.8.2 ... h²/0



5 Function

This chapter describes the functional principle of the hopper:

- Coin reception and payout
- Payout control
- Hopper control
- Anti-jam function
- Space-saving dual hopper assembly (coin passage)
- Empty and full detection (optional)

5.1 Coin reception and payout

The coins of a particular type are either filled in the hopper bowl before starting up the hopper or continuously sorted into the bowl by an upstream coin validation system. The funnel form of the bowl and the safety flap direct the coins to the rotating payout disc uniformly. The disc conveys the coins from the bowl via the coin outlet to the return area by means of metal pins inserted in the disc.

The maximum coin payout speed of nine coins per second (standard) may be reduced for, e.g., downstream coin validating systems using the switching block *(cp. Chap. "7.2 Setting payout speed (only h2/1 and higher)", p. 28).*

5.2 Payout control

An optical sensor in front of the hopper‘s coin outlet reliably detects each coin paid out irrespective of its surface properties (plastic tokens, dark or opaque coins). This tamper-proof sensor also prevents foreign objects from interfering or blocking the function of the sensor.

5.3 Hopper control

The control system communicates with the hopper using the serial ccTalk data transfer protocol. For more details about the ccTalk protocol please refer to section *Chap. "9.2 Interfaces", p. 35* and the ccTalk specification at www.ccTalk.org.

5.4 Anti-jam function

The hopper detects, if the coins can no longer be transported due to a jam. In this case it changes the rotational direction of the motor for 1.5s, so that the coins are splitt ed up on the transport disc and can be paid out again when rechanging the rotational direction.

If the coin accumulation and pressure onto the payout disc is so high, that the motor can no longer turn the disc, the rotational direction is changed for 0.5s and, if necessary, for further full seconds until the jam has been removed.

5.5 Motor reverse after coins have been paid out

The hopper should be configured so that it stops turning the payout disc after the last coin has been paid out during a transaction (default setting). If the "motor reverse function" is set to "1" the motor turns backwards for 60ms. This may result in coin jams and may only be set if coins getting stuck behind the ejector have to be removed.

For hopper configuration take note of the HopperTalk manual.

5.5.1 Timeout during payout (no coins found for payout)

If the hopper is empty and cannot find any coins which can be paid out, it changes the rotational direction of the motor eight times. If this timeout is too long for some applications which switch to other payout units or if the short cycles are sufficient, the hopper may be configured so that the rotational direction will only be changed four times. The forward and backward cycle times can be taken from the following diagrams:

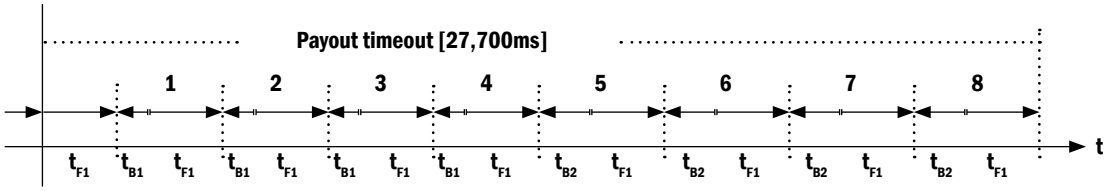


Fig. 6: Long payout timeout (standard)

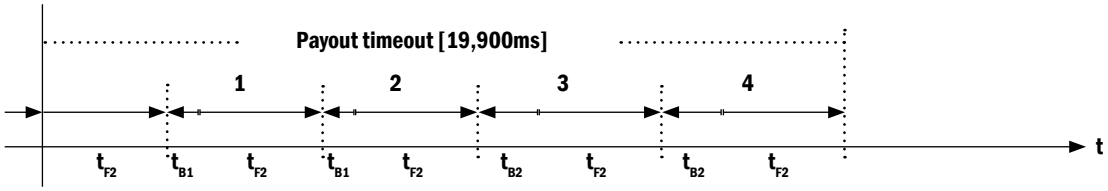


Fig. 7: Short payout timeout

t_{F1} = 2,100ms
t_{F2} = 3,100ms
t_{B1} = 600ms
t_{B2} = 1,600ms

For hopper configuration take note of the HopperTalk manual.

5.6 Space-saving dual hopper assembly (coin passage)

Thanks to the coin passage between the hopper's rear cover and coin payout unit it is possible to install two hoppers in the machine side by side and as close as possible.

If the hoppers are mounted accordingly, the coins paid out by the rear hopper can be directed into the return area of the machine through the coin passage of the front hopper. In this case the front hopper uses the coin passage as second coin outlet *(cp. Chap. "6.1.3 Aligning two hoppers with coin passage", p. 21)*.

5.7 Empty and full detection (option)

All hopper models can be equipped with an empty or with an empty and full detection.

5.7.1 Empty detection

The hopper uses the empty detection to signal the control system that the hopper must be refilled in order to be able to pay out further coins.

The filling quantity is monitored by electric contacts in the hopper bowl or bowl cover (cannot be retrofitted): If the hopper is full, the electric circuit is closed by the coins abutted on the contacts **[Fig. 8/]**. If the filling level declines below one of the contacts, the circuit is interrupted.

The empty detection is analysed by the hopper and transmitted to the control system (*Chap. "9.2 Interfaces", p. 35* or ccTalk specification at www.ccTalk.org).

Fig. 8: Coins abutted on empty detection

5.7.2 Full detection

The hopper uses the full detection to signal the control system that no more coins can be fed into the hopper, so that it does not overflow.

The filling quantity is also monitored by electric contacts in the hopper bowl or or bowl cover (connot be retrofitted): If the filling level is below the contacts, no current flows. If it is as high as the contacts, the electric circuit is closed by the coins abutted on the contacts.

The full detection is analysed by the hopper and transmitted to the control system (*Chap. "9.2 Interfaces", p. 35* or ccTalk specification at www.ccTalk.org).

5.7.3 ccTalk empty sensing (H217 Request payout high/low status)

If the h² nano is not supposed to send the empty signal according to the ccTalk specification (H217 response: Bit0 = 1 = hopper empty), the hopper can be configured so that the machine receives an inverted empty signal (Bit0 = 0 = hopper empty).

For hopper configuration take note of the HopperTalk manual.

6 Start-up

This chapter describes how to

- start up the hopper in a machine
- align tow hoppers with coin passage

For all installation work on the hopper or the machine please observe the following safety instruction:

The hopper may only be connected by a qualified electrician.

The hopper is not suited for outdoor use. For this it must be protected using a housing/machine with an appropriate protection class.

Do not use the hopper, if the device or connecting cable are demaged.

Select the correct voltage for the hopper (see label) and protect the device against overheat demage caused by e.g. short-circuit or overload by means of a 3A-fuse (according to IEC 127).

Never pull the connecting cable of the hopper from the machine when a voltage is applied.

Pull out the machine's mains plug before you install or remove the hopper.

6.1 Installing mounting bracket

The hopper is installed in the machine using the mounting bracket. Installation differs depending on the type of mounting bracket.

Please also compare the hopper's mounting dimensions in *Chap. "9.3 Mounting dimensions", p. 38.*

6.1.1 Installing mounting bracket with spigots

Install the mounting bracket in the machine in consideration of the both underside spigots **[Fig. 9/1]** using four fixing screws and the boreholes **[Fig. 9/2]** (Ø 4.2mm).

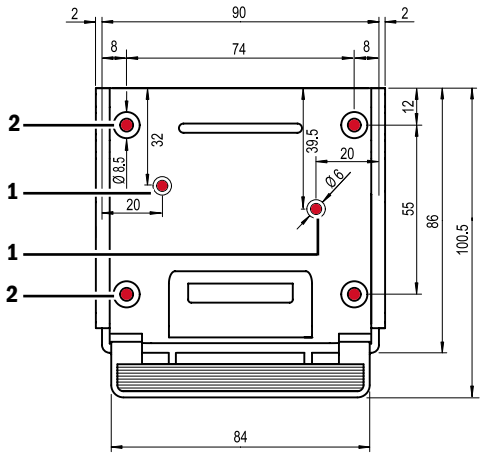


Fig. 9: Installing mounting bracket with spigots

6.1.2 Installing mounting bracket with large base plate

Install the mounting support in the machine using four fixing screws and either boreholes **[Fig. 10/3]** or **[Fig. 10/4]** (Ø 4.2mm).

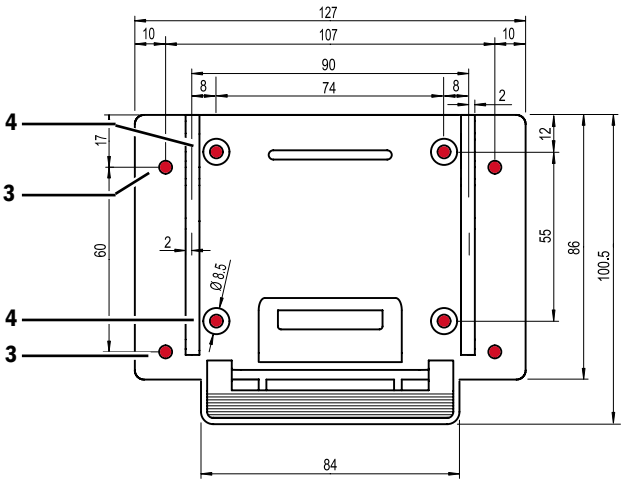


Fig. 10: Installing mounting bracket with large base plate

6.1.3 Aligning two hoppers with coin passage

If you want to install two hoppers and use the coin passage, the mounting brackets of the two hoppers must be installed in the machine, so that the coin outlet of the one hopper is aligned with the coin passage of the other hopper **[Fig. 11/]ff** for mounting bracket with spigots and section *Chap. "6.1 Installing mounting bracket", p. 20*).

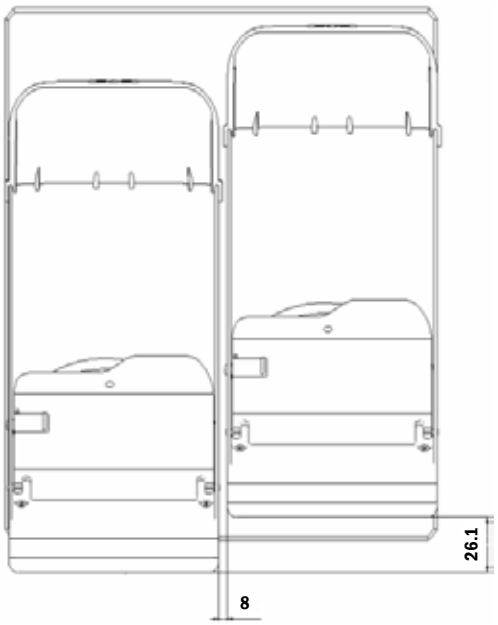


Fig. 11: Aligning coin passage – top view

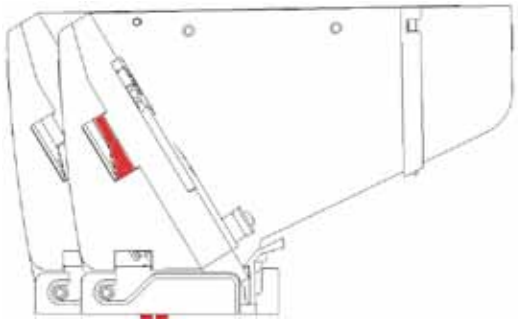


Fig. 12: Aligning coin passage – view from the side

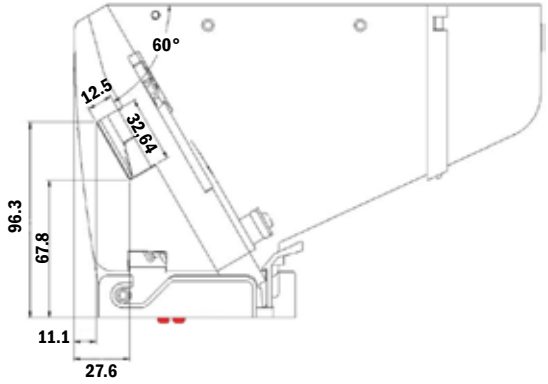


Fig. 13: Aligning coin passage – spigots an coin passage dimensions

6.2 Changing default settings (option)

If you want the hopper to operate with other DIL switch settings than ordered by you and set by NRI and want to reconfigure the hopper address (default setting: 3) or payout speed using the switches, it is advisable to change these settings before connecting and installing the hopper *(cp. Chap. "7 Operation", p. 24)*.

6.3 Connecting hopper

Depending on where the hopper(s) is/are to be installed in the machine, it is advisable to connect the hopper(s) first:

1. Disconnect the machine from the power supply.
2. Connect the hopper to the control system using the machine interface on the rear of the hopper **[Fig. 14/]** and connecting cable.

Fig. 14: Machine interface

6.4 Mounting and filling hopper

1 Slightly tilt the hopper at the rear and use its two mounting studs [Fig. 15/1] to slide the hopper in the rear guides [Fig. 15/2] of the mounting bracket.

2 Press the hopper into the mounting bracket, so that it engages behind the ejector lever [Fig. 15/3] of the mounting bracket.

Fig. 15: Inserting hopper in mounting bracket

Make sure that the safety flap of the hopper is installed correctly and engaged in the hopper bowl on both sides, so that the rotating parts are protected against access during hopper operation and the coins are transported to the coin outlet optimally.

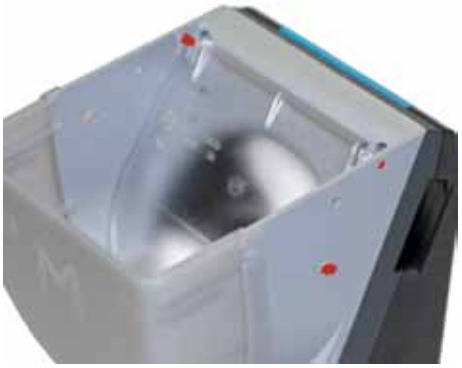


Fig. 16: Engaging safety flap

3 Fill the hopper with coins.

There are different hopper versions depending on the coins to be processed! To guarantee a proper hopper operation, please only fill those coins into the hopper intended for the corresponding hopper version (see label specification V1.0, 1.1, 2.0 etc. as well as *Chap. "9.1 Device data", p. 33*, **keyword "Coin payout")!**

4 Reconnect the power supply to the machine.

7 Operation

This chapter describes the operation, i.e. the setting of specific functions on the hopper itself:

- Selecting hopper address
- Setting payout speed ($h^2/1$ and higher)
- Removing hopper

7.1 Setting hopper address ...

The default address of the hopper is 3. If you want to operate more than one hopper, the second hopper must have another unambiguous address for error-free communication with the control unit.

The hopper address can be set via ccTalk MDCES (default setting) or using the hopper's switching block.

7.1.1 ... via ccTalk Multi-Drop Command Extension Set (MDCES)

Upon delivery, the hopper switching block is set to "Address setting via ccTalk commands":

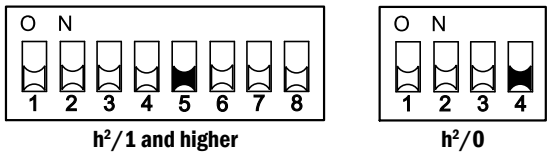


Fig. 17: DIL switch 5/4 set to "Address setting via ccTalk commands" (standard)

Applying the ccTalk Multi-Drop Command Extension Set (Headers 253–250) the hopper address can be checked and changed (cp. *Chap. "9.2.1.1 Implemented ccTalk commands", p. 36* and the ccTalk specification for all datails).

7.1.2 ... using hopper switching block

Tools: Slotted screw driver, pointed object

If you want to use the switching block to set the hopper address (default setting: 3):

1. Turn the power off.
2. Detach hopper from mounting bracket *(cp. Chap. "7.3 Removing hopper", p. 29)*.
3. Remove service cover (detach from the bottom using a slotted screw driver, [Fig. 18/]) to gain access to the switching block.

Fig. 18: Detaching service cover

Depending on the hopper series the DIL switches have different functions:

7.1.2.1 Selecting address on h²/1 and higher

4 Set DIL switch 5 of the switching block **[Fig. 19/1]** toward the top to ON to set the required address mode "Address setting using switching block".

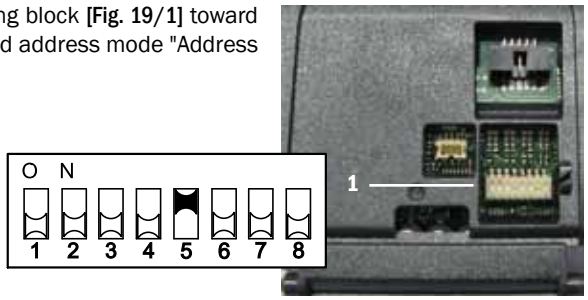
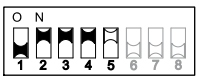


Fig. 19: DIL switch 5 set to "Address setting using switching block"

5 Use DIL switches 1 to 4 to set the required address:

Address	Switch setting	Address	Switch setting
3		11	
4		12	
5		13	
6		14	
7		15	
8		16	
9		17	
10		18	

6 Attach service cover and turn power ON again.

7.1.2.2 Selecting address on h²/0

5 Set DIL switch 4 of the switching block **[Fig. 20/1]** toward the top to ON to set the required address mode "Address setting using switching block".

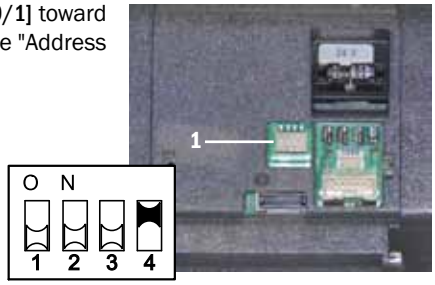
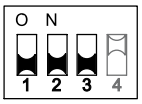
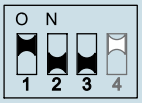
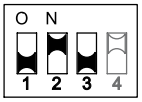
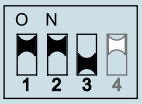
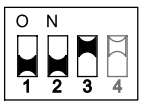
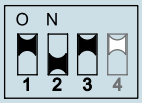
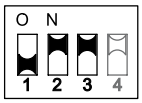
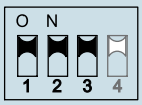


Fig. 20: DIL switch 4 set to "Address setting using switching block"

6 Use DIL switches 1 to 3 to set the required address:

Address	Switch setting
3	
4	
5	
6	

Address	Switch setting
7	
8	
9	
10	

7 Attach service cover and turn power ON again.

7.2 Setting payout speed (only h²/1 and higher)

The payout speed can be set between 100 and 50% of the maximum speed of 9 coins/second (standard setting).

Tools: Slotted scew driver, pointed object

To set the payout speed in steps of approximately 7–8%:

1. Detach hopper from mounting bracket *(cp. Chap. "7.3 Removing hopper", p. 29)*.
2. Remove service cover (detach from the bottom using a slotted screw driver, **[Fig. 18/]**).
3. Use DIL switches 6–8 of the switching block **[Fig. 21/1]** on the rear of the hopper to set the required speed.

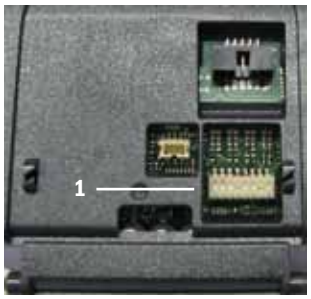


Fig. 21: Switching block

Payout speed	Switch setting
100% (9c/s)	ON 1 2 3 4 5 6 7 8
93%	ON 1 2 3 4 5 6 7 8
86%	ON 1 2 3 4 5 6 7 8
79%	ON 1 2 3 4 5 6 7 8
72%	ON 1 2 3 4 5 6 7 8
65%	ON 1 2 3 4 5 6 7 8
58%	ON 1 2 3 4 5 6 7 8
50%	ON 1 2 3 4 5 6 7 8

4. Attach service cover again.

7.3 Removing hopper

It is very easy to remove the hopper from the mounting bracket:

1. Press the ejector lever **[Fig. 22/1]** down **[A]** as far as its lips release the hopper.
2. Lift the hopper front **[B]** and disengage the hopper from the guides **[Fig. 22/2]** of the mounting bracket **[C]**.

Fig. 22: Removing hopper

8 Maintenance and service

In this chapter you will find out how to

- clean the hopper, and
- remedy the cause of a malfunction.

Please pull out the machine's mains plug before you clean or maintain the hopper.

8.1 Cleaning hopper (every six months)

The coins may leave residues on sensitive parts of the payout unit, when they are transported. These residues must be removed from time to time, in order to guarantee a reliable hopper operation:

- Cleaning interval: every 500,000 payouts/six month
- Cleaning agent: ethyl alcohol 96%, cotton bud/brush (with fine fibres, never metal), cloth

Do not use any solvents or scouring agents which attack the plastic of the device.

Do not submerge the hopper in any kind of liquid. This will damage the device.

1. Pull the machine's mains plug.
2. Pull the locking pinr [Fig. 23/1] of the safety flap [Fig. 23/2] inwards and fold the flap upwards.

Fig. 23: Folding safety flap upwards

3 Clean payout discr [Fig. 24/3] and all other parts, that are contaminated by the coins, with a cloth/brush.

Under no circumstances may the cloth be so wet that fluid runs into the device. Other the hopper will be damaged.

4 Clean the sensor [Fig. 24/4]/[Fig. 25/4] using a cotton bud with ethyl alcohol (access through coin outlet [Fig. 25/5]).

5 Let dry the damp parts for approx. 5 min.

6 Re-engage the safety flap.

7 Reconnect the machine to the mains supply.

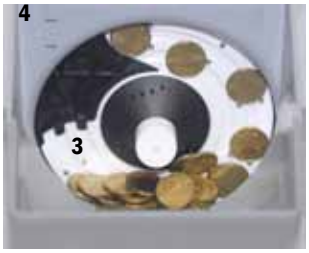


Fig. 24: Parts to be cleaned

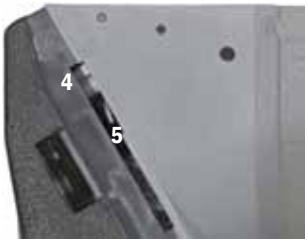


Fig. 25: Sensor access trough coin outlet

8.2 Troubleshooting

Malfunctions can occur in all electromechanic devices. These do not always have to be faults in the device. In many cases the reason is improper connections or incorrect settings. Therefore: please first of all check, whether the malfunction can simply be remedied using the following table.

Problem	Possible causes	Remedy, hints
Yellow LED flashing	Hopper is paying out a coin	No error
Red LED flashing 1x	Hopper error: Coin payout sensor (after switch-on) • covered by coin permanently • contaminated • defective	 • Eliminate coin jam • Clean sensor *(cp. Chap. "8.1 Cleaning hopper (every six months)", p. 30)* • Replace sensor (service case)
2x	Coin payout, although motor has not been activated by control system	Prevent manipulation
3x	• Coin jam although rotational direction has been changed several times (anti-jam function) • Hopper empty: Although rotational direction has been changed several times, no coin has been paid out	• Eliminate coin jam • Refill hopper
6x	Error, coin payout sensor	• Clean sensor *(cp. Chap. "8.1 Cleaning hopper (every six months)", p. 30)* • Check connection (service case) • Replace sensor (service case)
7x (slow payout)	Coin outlet blocked	• Eliminate blockade • Check outlet area • Check/replace ejector assembly (service case)
Hopper empty in spite of empty detection	Connection error, contacts	Connect contacts to the PCB correctly (ccTalk hopper)
Hopper overflowed in spite of full detection	Connection error, contacts	Connect contacts to the PCB correctly (ccTalk hopper)

If the malfunction cannot be remedied, please contact our service technicians.

9 Technical data

This chapter contains information about

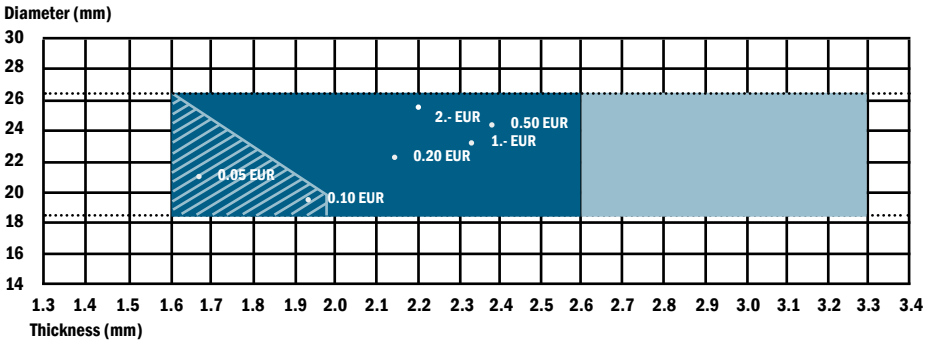
- all relevant hopper data
- the CE certification
- the machine and empty/full interfaces
- mounting dimensions

9.1 Device data

Supply voltage	h^2/1..: 11–35V DC h^2/0: 12/24V DC, ± 10%, 11–35V DC
Current consumption	Standby mode: approx. 0.6W,± 10% Inrush current, motor: approx. 4A (h^2/0: 3.5A), ± 10% (for approx. 75ms) Coin payout mode: ... with coins: approx. 6W,± 40% ... without coins: approx. 4.8W,± 40%
Electric strength	ccTalk: ccTalk data voltage
Inputs/outputs	
Temperature range	Operating temperature: 5 °C up to 50 °C Storage temperature: -25 °C up to 70 °C
Temperature change	Max. 0.2 °C/min.
Rel. humidity	10% up to 90%
Condensation	Not permitted
Machine interface	10-pole terminal strip (standardised) 9600 baud, 8-bit, N, 1, 1, 5 V TTL, common transmitting and receiving line, active low Protocol according to ccTalk 4.2, Money Controls *(cp. Chap. "9.2.1.1 Implemented ccTalk commands", p. 36)* For pin assignment see *Chap. "9.2 Interfaces", p. 35*

Coin payout

Speed: average of 7 coins/s
max. 9 coins/s
Coin diameter: 18.5–26.5mm (standard version and 1.1)
Coin thickness: 1.6–2.6mm (standard version and 1.1)



Version 1.0: h² nano standard
Version 1.1: h² nano standard for thin and small coins
Version 2.0: h² nano for thick coins

(cp. Chap. "2.2.3 Models", p. 9)

Maximum capacity

	Ø22.25 (2.14 thick) (20c)	Ø23.25 (2.33 thick) (€1)	Ø24.25 (2.38 thick) (50c)	Ø25.75 (2.20 thick) (€2)
h² nano S	300	230	230	200
h² nano M	570	440	450	370
h² nano L	700	530	550	520
h² nano X	920	710	680	620

Dimensions

Height: 154.0
Width: 131.4
Depth, h² nano S: 115.5
Depth, h² nano M: 154.5
Depth, h² nano L: 186.3
Depth, h² nano X: 225.3

(cp. Chap. "9.3 Mounting dimensions", p. 38)

Weight

h² nano S: 650g
h² nano M: 680g
h² nano L: 680g
h² nano X: 700g

Mounting position

Vertical, max. deviation: ± 3°

Directives applied

EMC: 2004/108/EC
EN 55 014-2 (interference resistance)
EN 55 022 (interference emission)
Machinery: 2006/42/EC
R&TTE: 1999/5/EC (Radio and telecommunication terminal equipment)
(cf. Declaration of Conformity)

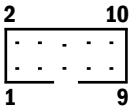
9.2 Interfaces

On the following pages you will find information for connecting the hopper to the machine:

- Pin assignment of machine and empty/full detection interface
- Implemented ccTalk commands

9.2.1 ccTalk machine interface

Pin no.	Function
1	ccTalk data
2	V DC
3	V DC
4	GND
5	GND
6	GND
7	V DC
8	GND
9	n.c.
10	V DC



9.2.1.1 Implemented ccTalk commands

Header	Name	Data transmitted by hopper
254	Simple poll	
253	Address poll *(checking address ambiguities)*	
252	Address clash *(Polling slave devices sharing same address)*	
251	Address change *(Changing a particular ambiguous address)*	
250	Address random *(Randomise slave device addresses)*	
246	Request manufacturer ID	"NRI"
245	Request ID	"Payout"
244	Request product code	"CURRENZA H2"/"Payout" *(cp. Chap. "2.2.3.4 ccTalk product code", p. 10)*
242	Request serial number	
241	Request software version	"437.nn"
236	Read opto states	
219	Enter new PIN number	
218	Enter PIN number	
217	Request payout high/low status	Empty signal according to ccTalk specification or inverted empty signal
192	Request build code	"Combo"
172	Emergency stop	
169	Request address mode	
168	Request hopper dispense count	
167	Dispense hopper coins	SCH1 format (cp. specification, "Format (b)")
166	Request hopper status	
164	Enable hopper	
163	Test hopper	SCH1 format (cp. specification, "Format (a)")
160	Request cipher key	
4	Request comms revision	"145"
1	Request device	

For more details please refer to the ccTalk specification (www.cctalk.org).

9.2.1.2 Communication example – Coin payout

1. Check the hopper status by sending the **TEST** command:
   Command: **03 00 01 A3 59**
   Response: **01 01 03 00 80 FA**
   The hopper is disabled.
2. Enable the hopper by sending the **ENABLE** command:
   Command: **03 01 01 A4 A5 B2**
   Response: **01 00 03 00 FC**

Optionally a new TEST command can be issued to verify the status of the hopper.

3. Request the CIPHER KEY from the hopper by sending the **REQUEST CIPHER KEY** command:
   Command: **03 00 01 A0 5C**
   Response: **01 08 03 00** *B9 FE 5F AC 75 0A 7B 98* **A0**
4. Start the payout of 3 coins [03] by sending the **DISPENSE COINS** command together with the *CIPHER KEY*:
   Command: **03 09 01 A7** *63 D9 2A 95 BA D4 35 82* **03 09**
   Response: **01 00 03 00 FC**
   The hopper ACKs the command.
5. During the payout, check the number of remaining coins every 100ms with the **REQUEST HOPPER STATUS** command:
   Command: **03 00 01 A6 56**
   Response: **01 04 03 00** *02 00 03 00* **F3**
   From the response can be seen that
   - *2* dispense commands have been sent
   - *0* coins are remaining
   - *3* coins have been paid
   - *0* coins are unpaid.

   Once the number of remaining coins is 0, the polling may be stopped and the payout can be verified.
6. Check the hopper status by sending the **TEST** command:
   Command: **03 00 01 A3 59**
   Response: **01 01 03 00 00 7A**
   From the status bytes can be seen that no payout timeout, opto blockings or coin jams have occured.

Optionally the payout can be verified by checking the coins paid, unpaid and total dispense counters using the REQUEST HOPPER STATUS.

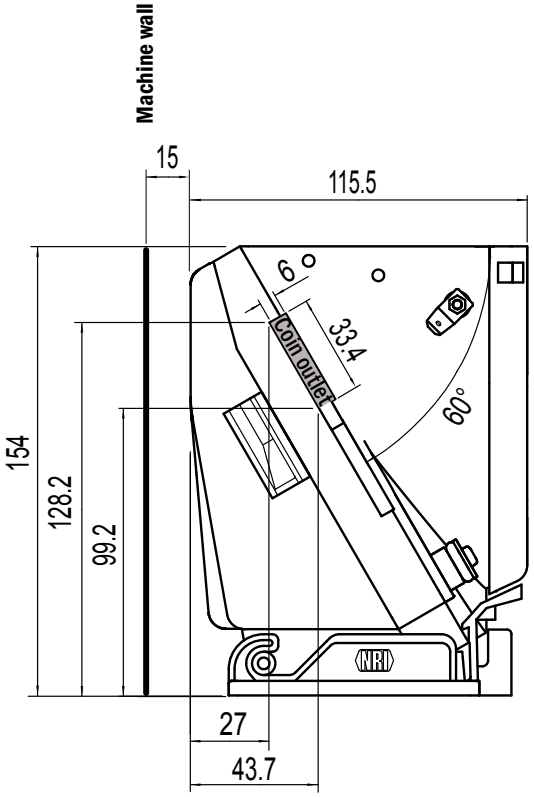
9.2.2 Empty/full detection interface

Pin no.	Function
1	Full
2	Empty
3	GND

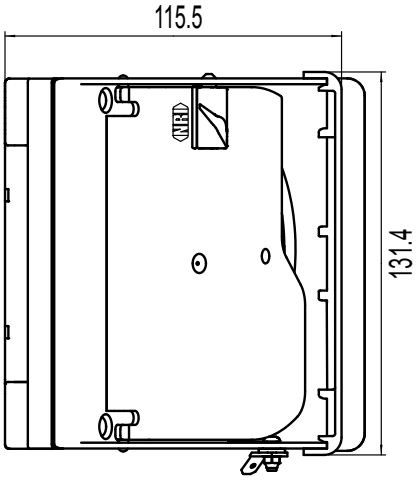
9.3 Mounting dimensions

9.3.1 h² nano S

9.3.1.1 View from the side

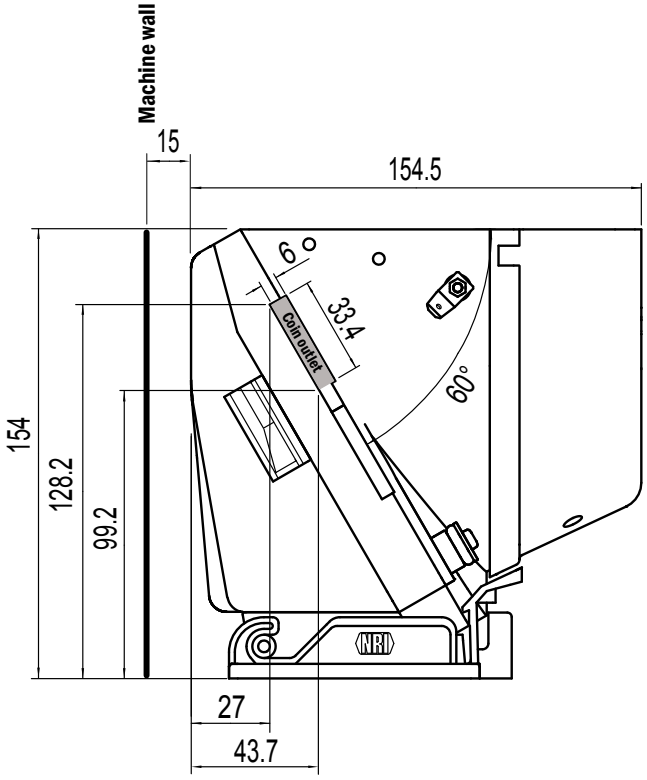


9.3.1.2 Top view

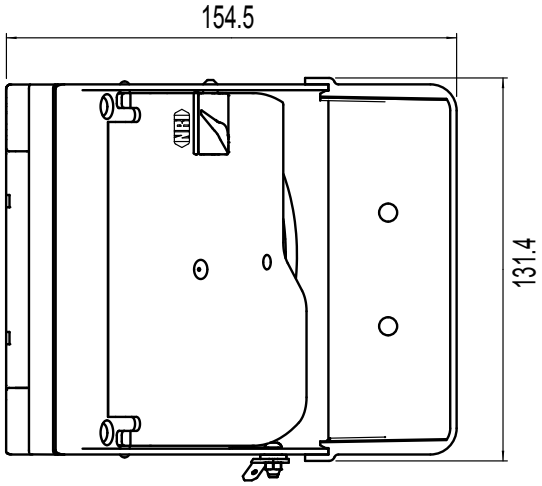


9.3.2 h² nano M

9.3.2.1 View from the side

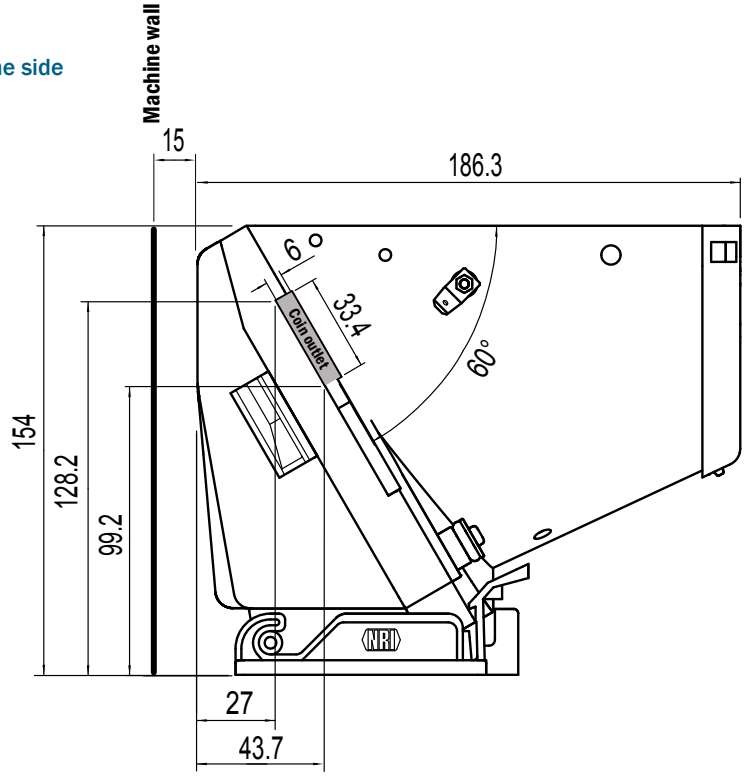


9.3.2.2 Top view

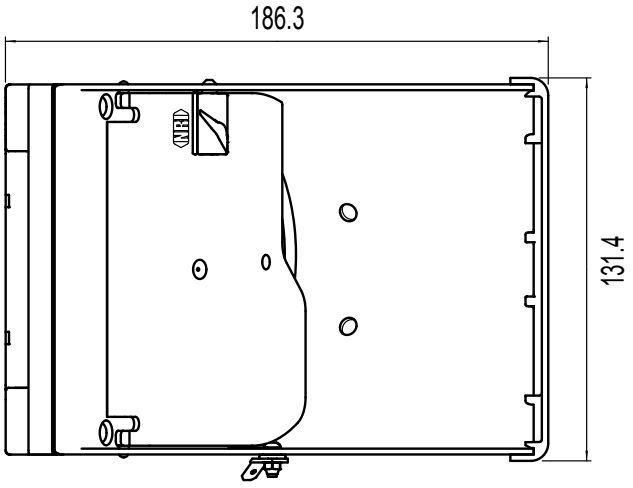


9.3.3 h² nano L

9.3.3.1 View from the side

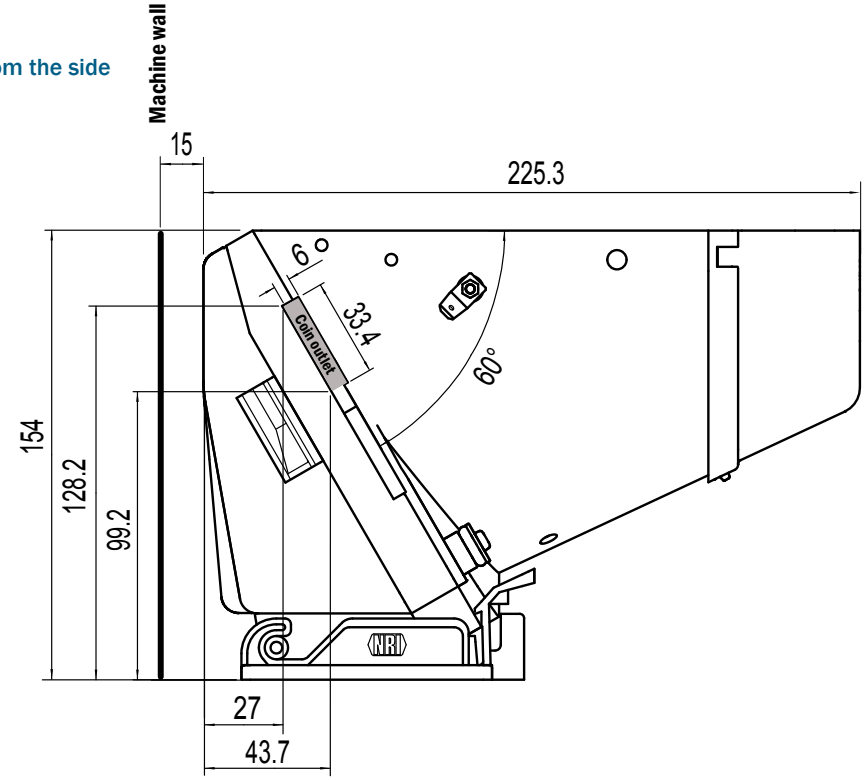


9.3.3.2 Top view

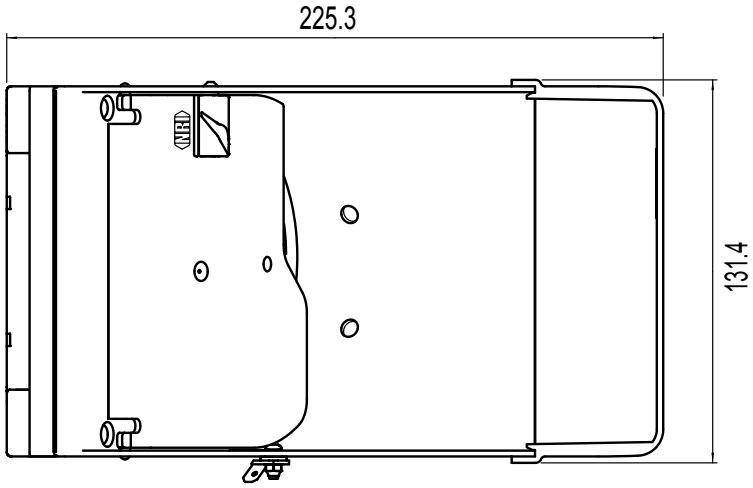


9.3.4 h² nano X

9.3.4.1 View from the side



9.3.4.2 Top view



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